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THOUGHTS

on

COLLECTING AND PRESERVING SUBSTANCES

for

MANURES.

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THOUGHTS
on the
Necessity and Advantages
of
CARE AND ŒCONOMY
in
COLLECTING AND PRESERVING
different
SUBSTANCES FOR MANURE.

Addressed to the Members of the AGRICULTURE SOCIETY
of *Manchester*, October the 12th, 1795.

BY THOMAS B. BAYLEY, F. R. S.
AND HONORARY MEMBER OF
THE BOARD OF AGRICULTURE IN LONDON.

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TO
THE RIGHT HON. THE EARL
of
STAMFORD AND WARRINGTON,
&c. &c.

The Observations on Manures, which I offered in October last, to the Members of the Agriculture Society of Manchester, being out of print, and lately called for; I reprint them with some Additions; and take the Liberty to address them to your Lordship, as the President of our Society, and in Testimony of the Respect with which I am,

your Lordship's
most obliged and obedient Servant,

T. B. BAYLEY.

Hope, near Manchester,
July 26, 1796.

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ON THE
Necessity and Advantages of Care and Œconomy
in
COLLECTING AND PRESERVING
different
SUBSTANCES FOR MANURE.

* * *

"*Let NOTHING be lost!*" is an injunction of Divine Wisdom, delivered on a very remarkable occasion.* This precept, by a fair analogy, may be supposed not only to prohibit all idle and negligent waste of provisions, but also to enjoin the most minute attention and care, in collecting and preserving all such matters, which together, or separately, may operate as manures, and may increase the produce of the fruits of the earth in their season.

This branch of rural œconomics has been esteemed worthy the attention of the most enlightened and flourishing nations. The Romans were remarkable for employing every means of increasing their manures; and to a similar attention of the government of *China*, is principally to be ascribed the subsistence provided for the immense population of that extensive empire.

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* Saint John, Chapter vi. Verse 12th.

During the present scarcity of corn in Great-Britain, necessity and want have forcibly called upon us, to use every effort to lessen the grievance, and to guard against its continuance, or return.

The *Board of Agriculture* have, with great vigilance and zeal, pointed out, in various addresses and publications, the means of restoring plenty. The fifteenth chapter of their proposed Report *on the subject of Manures*, and the additional appendix to it, have suggested to me the scheme, and some of the particulars of this address. The *Earl of Dundonald*'s excellent treatise, "shewing the intimate "connection that subsists between agriculture and "chemistry;" and *Mr. Kirwan*'s ingenious "Es-"say on Manures," have also greatly assisted me in forming this little manual for the use of the husbandman. The subject of it, to many, may appear trifling, but it reminds me of a motto, which was engraved on the gold medal presented by this society, a few years since, to the *Countess of Moira;* whose intelligence and charity induced her to make some very successful attempts to form, amongst her poor neighbours, a valuable manufacture, from *the refuse of flax and hemp.*

"*Ex minimis, maxima.*"

Under our common management of manures, the practice is quite the contrary of what it ought to be; we do *not* encrease and accumulate, but *waste* and *disperse* almost every substance which can be converted into a manure and improve the soil.

Prudence and œconomy point out, that what is easiest and *cheapest* to be done, should be *first* done. Let the *careful farmer* save and collect manures, and make composts, as he is instructed in this little book; he will soon find the means, from his encreased crops, to prosecute more expensive improvements. Let him, then, attend to the situation of his FARM-YARD and OFFICES; and the manner of placing and forming his DUNGHILLS.

With respect to the former of these, many great improvements, respecting contiguity, etc., have been introduced, which it is not here necessary to mention, further than to suggest the forming channels in the stables and shippons, to convey all the urine of the horses and cattle *to proper reservoirs.*

Dunghills ought to be situated nearly on a level; with a stone or brick floor, laid in clay or tarrass mortar; enclosed on three sides by a wall five feet high, of the same kind, and open on one side. Its exposure should be to the north. At the end of it, *the reservoir* should be placed for the urine from the buildings, and the drainage of muck-water from the dunghills. This should be of sufficient capacity, not too deep, and be secured by bricks set in clay or tarrass mortar; in it should be placed a *pump*, to draw off the moisture for frequent use. In the chapter on *manures*, above referred to, (page 28) is a plan of a *covered* dunghill; and the appendix to this chapter (page 7) contains a scheme of a dunghill and reservoir.

Warmth and moisture are requisite to carry on the *putrefaction* of dunghills; and it is advised, in dry weather, to throw over them frequently, by a pump or ladles, the contents of the reservoir. The fermentation of the dunghills will likewise be promoted, by often adding a layer of *peat earth*, or good soil. It is injurious to put *lime* to the heap, before it is duly fermented; then it is a most valuable addition to the compost for all purposes. *Dung may be kept too long;* in time it will lose all its fertilizing qualities.

In forming a dunghill, what is *daily* collected, should be *lightly* thrown on, as is practised in making a *hot bed;* and the dung of a hot bed, at Midsummer, or in a few weeks after it is made, is in that *pefect* state, in which it is most beneficial to apply it to land, *by itself;* or to form it into *composts*, with lime, soil, peat-earth, etc.

Besides dung, many other substances to be used as manures, deserve the most careful attention of all farmers.

1. MUD. This is composed of decayed and fermented leaves, and of various kinds of vegetables: of the drainings from dunghills and farm-

offices, *improperly placed:* of the urine from stables and shippons: of the finest soils from new-plowed lands, and fields recently manured or limed: from streets, highways, and manufactories, etc.; which are all perpetually washed and carried off by the rains, and deposited and *lost* in ditches, brooks, ponds, mill-dams, and rivers.

The tide of the sea also leaves on many parts of the coast, and at the extremity of salt marshes, considerable quantities of sea ooze, or *salt sludge*, of a most enriching quality. To search for, save, and collect MUD of some sort or other, is more or less in every farmer's power; and by making more strait, wide, and deep, the layer ditches of a farm, and the courses of small brooks and rivers, with occasional *stops* and *dams* to form still water, great quantities of rich mud may be obtained.

Before it is mixed with lime or dung into a compost for pasture or meadow lands, it must be exposed to the air for some time, and be quite drained of its water.

2. URINE. This is said to be a more perfect extract from the animal system than dung; our surprise, therefore, must be excited, that it is so much neglected. Not a *particle* of urine, or of the drainings from dunghills, the very essence of the manure, should be lost, but collected into proper reservoirs.

Chamber-lye is a more perfect manure (when putrified) than the urine of horses or cattle.

Urine of all kinds, when collected, and *ferment-*

ed in quantities, is a most powerful ingredient to form composts, or top dressings with peat earth, mould, or other absorbent substances. In *large towns* it might also be preserved, and made an article of considerable profit to those who collect it, for the purposes of *agriculture*, as well as those of *manufactures*.

3. SWEEPINGS OF THE STREETS, in towns; and COAL ASHES, finely sifted, and kept *dry* and separate, even in the neighbourhood of London, it is only from a very late date that the farmers have found out the great value of these manures. The parish of *Marybone*, a few years ago, paid to the scavengers 500 l. per ann. to remove these; now the scavengers pay the parish 1050 l. per annum, for the liberty of carrying them away.

In our large *towns* and manufactories, immense quantities of coal are consumed, and with very little care or frugality. Were the cinders duly and *finely* sifted; and the *ashes* kept *dry* and separate from other substances, to sell to *dust-men* appointed (as in London) to collect them at stated times, there would be a great saving of fuel, and no small profit from the *ashes sold*. There are very commodious and cheap machines, and of all sizes, now in use, for private families to sift or riddle coal, cinders, and ashes.

4. NIGHT-SOIL. Decency and health re-

quire every practicable means to be used, to render *innoxious*, or speedily to *remove* all accumulations of this kind from our dwellings. Yet why is this manure, which is esteemed by far the most efficacious *of all others*, most commonly lost in *England*, even in the midst of our real distress for want *of corn?* In *China* and *Japan*, we are told, the *laws* prohibit the waste or neglect of human excrements; and enjoin to every family to make reservoirs for its preservation: the cultivators of their soil use, solely, this *manure* to raise *corn;* because, unlike the dung of horses and cattle, it contains not the seeds of weeds.

If the privies belonging to each family were duly constructed, with air pipes for ventilation; if the bottoms and sides of the receptacles of the night-soil were formed of bricks set in *tarrass mortar*, so as to retain the moisture (the most enriching part of this manure); and if earth, saw-dust, *fine sifted* coal-ashes; but more *especially fresh-slaked lime*, were frequently thrown down the privies, all disagreeable and unwholesome smells would be prevented, and the quantity and value of the compost greatly encreased. By this management, its removal would be also rendered convenient and inoffensive to those employed.

5. BONES. The great benefits derived from the use of bones, as a top dressing, are well known; yet they are not duly collected or used. Before they are applied to the land, they ought to

be reduced to very small pieces, or powder, by the aid of machinery, and they well repay this trouble and expence. Where the quantities are too small to render it prudent to erect a machine to break them down, (which is the best way) may not bones be reduced to powder, by putting them in an heap of lime, as Mr. PAGET intimates, in the Report of Leicestershire? I suppose he means *quick* lime, and that the heat produced by slacking it with water, dissolves the bones.

6. REFUSE MATTERS, of various kinds, viz. of the flesh of shambles and other animal substances, of fish, of soap-boilers, of tallow-chandlers, of shoemakers' chips, of dye-houses, of printing-works, of rags, of hair, of horn, of scrapings of oiled leather, *sweepings* of cotton and woollen mills, workshops, warehouses, etc. Rubbish of old buildings, etc., etc.

7. SEA WEED, SEA SHELLS, and SEA GRAVEL.

8. RIVER WEEDS. Of these there are great abundance in many rivers, meres, brooks, ponds, and wet ditches. When these are in full vegetation, they should be taken out, and be laid, for a few days, in small parcels, to let the water drain from them. They should then be laid in large heaps to *ferment;* when this is over, the weeds should be mixed with three times their quantity

of earth, and some lime, and after a short interval turned and well mixed into a top-dressing for grass lands.

9. SWEEPINGS OF ROADS, to mix with lime.

10. SPENT TANNER'S BARK, to mix with lime.

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11. PEAT, or MOSS EARTH. It may reasonably be expected that at no very distant period, the peat mosses of Great Britain and Ireland will be drained, and brought to the highest state of fertility. Their present superabundant moisture renders them not *merely* unproductive wastes, but extremely injurious to the drier lands in their vicinity. The invention and energy of a Wakefield and an Elkington, in reclaiming and improving *mosses*, cannot fail to excite a general imitation of the very successful processes, by which they have rendered those bogs productive of plenty; with the additional happy effects which those improvements never fail to produce on the *climate*, *temperature*, and *vegetation* of all the countries adjacent to them.

But a further and most beneficial use of peat mosses now claims our attention; *peat earth* is capable of being converted into the most valuable of *all manures*. From experiments made with alkaline salts (pot ash) and peat, it can be asserted, that the effects of such mixture, weight for weight, are equal, if not superior, to those of *dung*.

Peat or *moss* earth, when intended to be used as a manure for other lands, should be dug up at the depth of two or three feet from the surface, in small pieces, and left exposed to the air for three or four months, or till the dry weather of summer, or the frosts of winter, render it convenient to cart it away. By a due exposure to the atmosphere, it derives from it, what is called *oxygen*, or pure vital air; and is converted into a new saline compound, highly serviceable to vegetation. The use of peat earth has been known some time in different parts of *Lancashire*. About *Leyland*, *Rainsford*, and *Knowsley*, farmers cart it from considerable distances.

The very intelligent Mr. BUTLER, (who lately was gardener to the *Earl of Derby*) states, that for some time past he has used peat earth (dug as above directed) as a manure, with the greatest success, both in the garden and in the field. On thin clay soils, he says, it is very efficacious. And from a meadow, dressed with forty loads per acre with a compost, made of *three-fourth* parts of peat earth, and *one-fourth* part of dung, greater and more *lasting* crops of hay were produced, than from the like quantity of the best dung.

Peat earth, may be used alone to advantage, if laid in considerable quantities, on thin soils. The most beneficial preparations or combinations of peat will be found to be

Peat earth, with dung and urine;
Ditto, with alkaline salt or pot ash;
Ditto, with lime.

When the soil does not contain a due proportion of calcareous matter (as old meadows, etc.), the two last are to be preferred, until it shall have received a due proportion of this article, so indispensably necessary to produce sweet herbage.

It is said, that one hundred pounds weight of alkaline salt or pot ash, is sufficient to saturate peat earth enough to top-dress an acre.

To form a compost of peat earth with *lime*, it is recommended by LORD DUNDONALD, to put *five* or six times the weight of peat earth to *one* of lime; to mix them when the lime is fresh slacked, if it may be under cover, otherwise that the heap shall be so formed and placed, and so covered at the top with soil, that the rains may not injure it. When the compost is mixed together, the peat earth should be moderately moist, and finely broken.

Where this valuable, but hitherto much-neglected, substance can be carted from a moderate distance, or by *water carriage* conveyed to more remote situations, it is hoped it will have a primary place in the farmer's calendar, especially within the circuit of our society, where there is such an abundant supply of peat.

On the *sea-coast* of *Lancashire*, the lands in general are such as would receive the highest improvement from a due application of peat earth; and in many places, as at Halsall, Rafford, and in the Fylde, large mosses are near at hand. Now SEA WATER is found to possess powerful effects in promoting putrefaction, and if applied in sufficient quantities to PEAT EARTH, dung-heaps, and other composts, it would prove highly beneficial to all farmers situated near *the sea*, and in the vicinity of *mosses*.

The EARL OF DUNDONALD says, a ton of sea water contains from a *bushel* to a *bushel* and a *quarter* of sea salt, beside a certain proportion of the *vitriolic salts*. This quantity cannot be purchased in England for seven shillings; but which farmers near the sea may procure at the trifling expence of carriage, by water-carts, etc.

By wind-mills and steam-engines, *sea water* may be raised to such a height as to be conveyed by pipes, or small open canals, to a very considerable *inland* distance, each farmer, or proprietor receiving, as it passes, the necessary supply.

On a calculation of the expence of raising *sea water*, by a fire-engine, the EARL states, that farmers may be supplied with a quantity of it, equal to a bushel of salt of 56 lbs, at the expence of one penny farthing; whereas a bushel of salt would cost him *six shillings*.

These are important facts, and merit the fullest trials.

12. **DECAYED VEGETABLES** from the gardens, etc. and leaves of trees.

13. The PUTRID WATER of stagnant pools, ditches, etc. and from the steeping of flax, and hemp; from tan-pits, etc.; and from reservoirs for *dung-water*, to be carried on the fields by water-carts, or mixed with peat, or soil, and lime, into a compost.

14. The ASHES of whins, fern, heath, ragwort, thistles, docks, weeds, coarse grass, dressings of hedges, collected and burned, *by close fires*, into *ashes*.

15. The REFUSE of bleachers and printers' ashes, and the great quantities of *refuse ley* in those works, and in the manufacture of soap, which are still suffered to run to waste. These would make fertile composts, with peat earth or other soils.

16. SOAP-SUDS or LEY. The quantities of this valuable article, which are thrown away throughout this kingdom, are immense. Were it preserved by each private family, it would form, with proper earths, an abundance of good top dressings. The *Chinese* are minutely attentive to this article; even their barbers save their suds. The refuse water of the wash-tubs is very useful in gardens, and for fruit trees.

17. A great addition may be made to the manure of a farm, and the quantity of dry litter,

by

by collecting in their strong growth, (though before they ripen their seeds) fern, coarse bent, ling, heath, and the coarse herbage of pastures and hedges, refused by the cattle. When these are rotted, either in the farm yard, or in the stables or shippons, mix them in heaps with dung to *ferment*, and put in their place a supply of the same dry litter from the stack, and so go on till the whole is used.

18. PEAT ASHES. In some parts, as in Berkshire, these are a very valuable manure; a statute acre (near Newberry) of peat, has been sold for 200l. to burn. The EARL OF DUNDONALD states, that *in general* to burn peat for ashes is a wasteful process, as *seldom* one-twentieth part of the weight of the peat is procured by combustion; the remaining *nineteen* parts are thrown into the air.

19. The use of WATER, as a *manure*, by floating or irrigation, is an object of the greatest consequence to the agriculture of our counties; in many parts it may be practised with the utmost facility and advantage. With astonishment I have beheld farmers leading dung to their meadows, purchased and carried at an enormous expence, whilst they suffer the draining of their home-made dunghills, and the wash of their stables, farm-yards, and fields, to run waste into the brooks and rivers; whilst they *unconcerned* neglect every advantage they might procure, or *actu-*

ally possess, of enriching *these very meadows*, by *floating* them in rainy, or *watering* them in dry seasons; although the expence and trouble, would be in comparison *as nothing*.

Those who are inclined to improve their lands by *irrigation*, or floating, are desired to see what *has been done*, in this way, by Mr. RICHARD JONES, at the Antelope, in *Little-Hulton*, near the *ninth mile stone from* Manchester, on the *turnpike-road* to Wigan and Chorley; and to read Mr. GEORGE BOSWELL's Treatise *on Watering Meadows*, printed for Debrett, London.

20. There is another source of improvement LOST to the country, but *not* through the fault of the farmers, viz. *Refuse Rock* SALT, and REFUSE LIQUOR from the salt-works. I trust the very impolitic restriction which forbids the use of this valuable manure, and causes its *total loss*, will soon be removed by the exertions of this society, and those of the Hon. Board of Agriculture.

21. Another œconomical saving of *manure*, and great benefit to the public, will arise, by soiling or feeding the *working horses*, and perhaps the *cattle* of a farm, with clover, summer vetches, or tares, or *grass* from the adjoining meadows, in the *stables*, *shippons*, &c. This judicious practice, as it respects horses, is now adopted in many parts of England. In the Low Countries, *cows* are *always* fed in the house; and in the Report of the West

Riding of Yorkshire, drawn up by Messrs. *Rennic*, *Brown*, and *Shireff*, we read, that in the neighbourhood of *Leeds*, *cows* have been kept all the summer in the house, and fed with *grass*, fresh cut from the field. The urine of the cows was kept in a reservoir, and conveyed to the land, by which means, and by a dressing of manure in the winter, the *same field* of four acres was cut *four* or *five* times, and ten cows were thus fed from it during the season.

Experience only can teach, or warrant the belief of how few acres of ground, under the culture of *clover* or *tares*, when cut green, and daily given to working-horses or cattle, will suffice for their maintenance; and what vast quantities of the best manure may thus be collected.*

ON LIME.

Various and contradictory are the accounts given of the uses and effects of LIME on similar, and on different soils. The EARL OF DUNDONALD, in his Chemical Analysis of Earths and Lime, gives a very satisfactory explanation of these difficulties. One circumstance particularly deserves our attention; it is this, that lands, by *long-repeated* dungings, (such as our *old* meadows and *gardens*) accumulate *too large* a proportion of vegetable matter; whereby the soil is at length converted into an *inert vegetable compound*, of the nature of *peat*. Hence we may account for the extraordinary good effects of *lime* and *marle*, pot-ash, soaper's waste, and salt, but especially of *lime*, when applied to such soils; and recommend a *change* of manures for our lands in general, as a mode of husbandry, not only more œconomical, but also vastly more profitable. The writer of this has long practised it with great success, both with respect to his meadows and *garden*. In the latter, the crops, after deep trenching WITH LIME, have proved remarkably *sweet* and *good*, and were also more abundant: and the hay of his old meadows was equally improved by *lime*. By this course of manuring, *another important object* may be gradually obtained, viz. the improvement of our *poor neglected pastures*. The dung, which we now hurtfully spread, from year to year, in perpetual succession, on the same fields, would effect a happy change in the miserable produce of the *pasture lands* of the farm; if it was laid upon them early in spring, alone, or mixed with earth and lime.

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* See Dr. *Anderson*'s ingenious observations on this subject, in the *third* volume of his "Essays relating to Agriculture and Rural Affairs," *lately published*, page 513—539.

The common practice of mixing *hot*, *unslacked lime*, with dung, in any state, is found to be injurious. But lime, deprived of its causticity by water, may be very properly added to dung, when quite putrid and rotten, in conjunction with good soil, peat-earth, etc.

Whilst dunghills are *under* the putrefactive process, rich surface-mould is the most proper addition, in moderate quantities, to promote and complete its dissolution. The vitriolic neutral salts, in due proportions, will *also* greatly accelerate the putrefaction.

Lime is a most invaluable manure, and its application almost *universal.* Happy will it be for this country, when, from the various *canals* which are now making, and are still further projected, we shall receive ample supplies of it from the sea-coast, and from the immense lime rocks of Derbyshire, Craven, and North Wales. The Writer of this, from long experience, recommends the use of *lime*, laid on *alone*, early in summer, on *old clay pastures*, which have a very thin stratum of soil: he has laid, in the proportion of two hundred bushels of lime, on a statute acre of such land. The fields were first drained, and have remained in *pasture* ever since the liming, twenty years ago, and have been gradually improving. In examining the staple of these fields, the writer has uniformly found the effect of liming, described by *Lord Dundonald*, viz. "the depth of the soil has "been increased, and rendered *less retentive of* "*water.*" This important amelioration is only to be brought about by a *sufficient quantity* of lime: and it is well observed on the use of lime as a manure, either alone, or in compost, "that doing "things partially, never answers." "And that "land repays in general more abundantly for the "*last* (or an effectual) application of manure."

Marle is a manure so well known, and so profitably employed, that it is unnecessary to recommend its use. But I cannot think it foreign to the purpose of this paper, to state the great advantages of *searching* for it in situations where it is commonly supposed it is *not* to be found. The wonderful improvements now carrying on by Thomas Wakefield, Esq., on Trafford-moss, near Manchester, by covering the bog, recently drained, with *marle*, which he searched for and discovered in great quantities in the midst of this moss, hitherto deemed irreclaimable, are worthy the attention of this society. Mr. Wakefield's works are carried on with great intelligence and energy, and rank him amongst the first benefactors of his country.

These observations are sufficient to prove the advantages of increasing, by a vigilant œconomy, the quantity of manures. This care and attention are essential to good husbandry; for true is the old *Scots* proverb, "*muck is the mother of the meal-chest.*"

FINIS

ERRATUM.

Page 9, line 14, for *layer* read *larger*.

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